MANUFACTURER DOCUMENT PACKAGE

# Manufacturer's Manual

Reference package for procurement and maintenance review

INVENSYS TRICONEX

## 3502E

**TMR DIGITAL INPUT MODULE**

Used with the applicable Tricon v9-v10 system configuration.

**REFERENCE PACKAGE**

Selected official pages follow this cover with source pagination retained.

**OFFICIAL DOCUMENT**

Invensys 9700077-012, February 2009

## 24 to 48 VAC/VDC Digital Input Modules

This figure is a simplified schematic for models 3502E, 3503E, and 3505E, which are 24 to 48 VAC/VDC, 32-point TMR Digital Input Modules with a self-test feature. The self-test feature continuously verifies the ability of a Tricon controller to detect the transition of a normally energized circuit to the Off state.

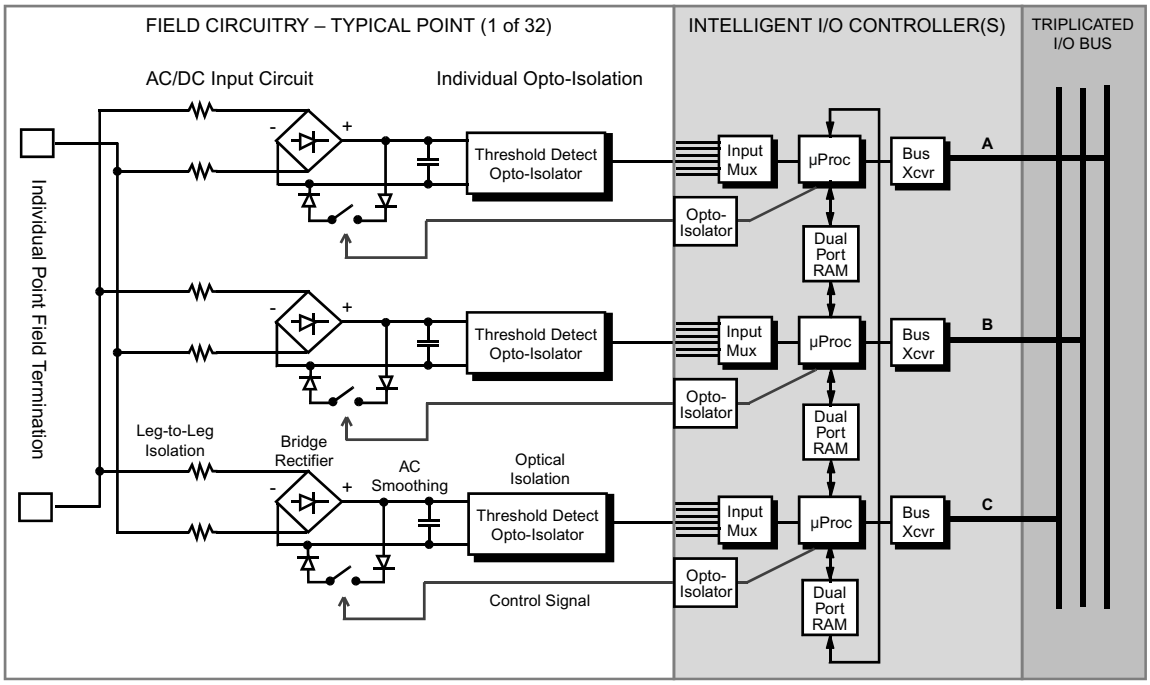


**Figure 30** 3502E, 3503E, and 3505E Simplified Schematic

This figure shows the front panels of models 3502E, 3503E, and 3505E.

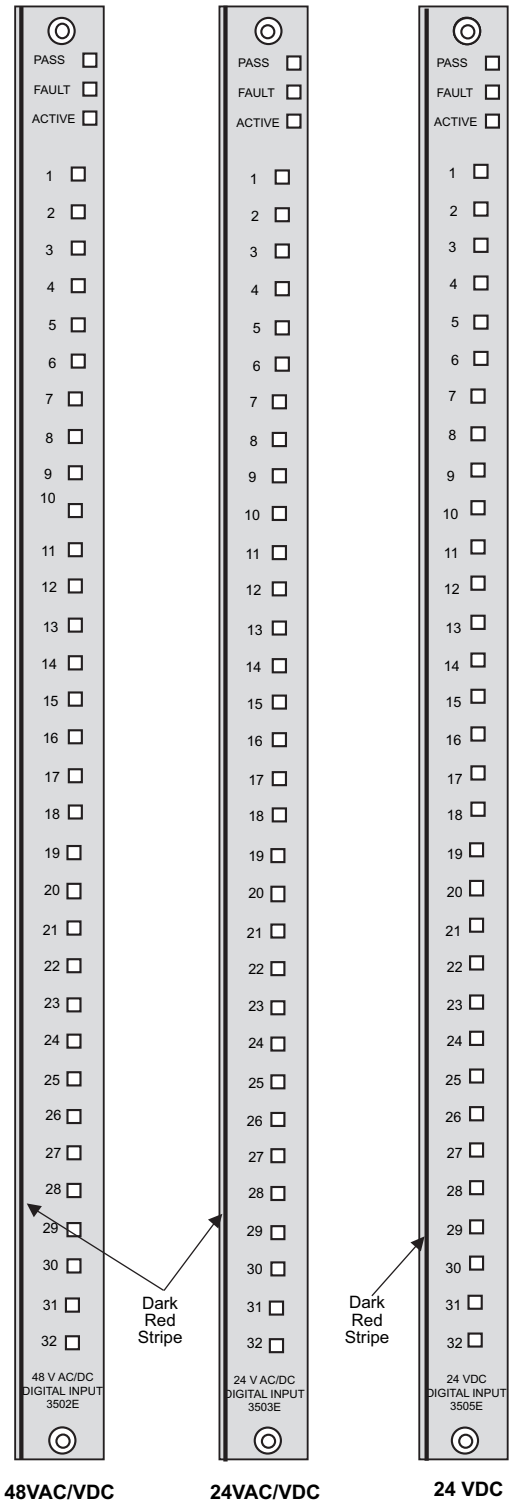


**Figure 31** 3502E, 3503E, and 3505E Front Panels

## 3502E Specifications

This table lists the specifications for model 3502E, which is a TMR Digital Input Module with a nominal input voltage of 48 VAC/VDC and a self-test feature.

**Table 25 3502E Digital Input Specifications**

| Feature | Specification |
|---|---|
| Color code | Dark red |
| Number of input points | 32, commoned in groups of 8 |
| Input frequency range | DC or 47-63 Hz |
| Recommended input range | 35–95 VAC/VDC |
| Maximum voltage | 95 VAC/VDC |
| Switching level: Off to On | 27 VAC/VDC typical, 32 VAC/VDC worst-case |
| Switching level: On to Off | 14 VAC/VDC typical, 11 VAC/VDC worst-case |
| Typical hysteresis | 7 VAC/VDC |
| Nominal turn-on | 6 mA to 9 mA |
| Input impedance | > 2.9 kΩ nominal |
| Input delay: Off to On | < 8 ms |
| Input delay: On to Off | < 15 ms |
| Point isolation, opto-isolated | 1000 VAC minimum, 1500 VDC minimum |
| Status indicator: On or Off state | 1 per point |
| Status indicator: Module status | Pass, Fault, Active |
| Logic power | < 10 watts |
| Nominal field power load | 1.0 watts per On point, 3.2 watts @ maximum field voltage |
| Leakage current to chassis @ 60 Hz | 0.5 mA maximum per On point |
| Input diagnostic fault coverage[1]: Maximum input toggle rate | Every 100 ms |
| Input diagnostic fault coverage[1]: | |
| Minimum input toggle rate, On state | Not required |
| Minimum input toggle rate, Off state | Every 3 months (manually toggled by the user) |
| Diagnostic glitch duration[2] | 20 ms typical |
| Output voltage | < $1/2V_{IN}$ |
| Output impedance | < 4.22 kΩ |

1. The maximum input toggle rate enables proper operation of I/O diagnostics and detection of all normally detectable faults. The minimum toggle rate provides fault coverage of normally undetectable faults within 10% of the calculated mean-time-between-faults (MTBF) for the module.
2. $V_{IN}$ is the voltage applied to an energized point. Output voltage is noticeable on an adjacent de-energized point for the duration of the diagnostic glitch. Be advised that the glitch output may falsely energize the paralleled input of another piece of equipment.

## Replacing I/O Modules

This procedure explains how to install an I/O module. If an I/O module has a field fault and a module fault, resolve the field fault first.

**WARNING**

Before you remove a faulty I/O module, ensure the following are true:

- The Active indicator is illuminated on the hot-spare module.

  –or–

  The Active indicator is illuminated on the newly-inserted module if there was an open position in the logical slot and you inserted a replacement module.
- The Active indicator on the faulty module is off.

For fault indicators, see I/O and Communication Module Indicators on page 236.

### Procedure

1. If a hot-spare module is installed and the Active indicator is on, remove the other (faulty) module by loosening the retractable fasteners, grasping the fasteners and sliding the module out of the chassis. In the unlikely event that neither module has an Active indicator on, contact the IPS Global Client Support (GCS) center.
2. Install an identical type module in the empty slot and push the module in until it is firmly seated. Tighten the retractable fasteners of the module to 10 inch-pounds.

   For the replacement module, the Pass indicator should go on after about 1 minute; the Active indicator should go on within 1 to 2 minutes.
3. If the replacement module is not a hot-spare, wait until the Active indicator of the faulty module is off, then remove the module.
4. Identify the model and serial numbers on the faulty module. Contact the IPS Global Client Support (GCS) center to obtain a Returned Material Authorization (RMA) number. Then return the module to Triconex for repair.

**Note** In rare cases, a field device malfunction may cause a module to fault. If replacing the module does not resolve the problem, verify that the field device is properly connected and in good working order. If the problem is still not resolved, please contact the IPS Global Client Support (GCS) center for assistance.